

REMARKS

Responsive to the outstanding Office Action, applicant has carefully studied the Examiner's rejections. Favorable reconsideration of the application in light of the following arguments is respectfully requested.

Claims 1-3, 8 and 9 are pending in the application. In the response claim 1 has been amended and claims 4-7 have been canceled. It is respectfully submitted that no new matter was added in making these changes.

REJECTIONS UNDER 35 USC 102

Claims 1-4 and 7-9 were again rejected under 35 USC 102 as being anticipated by Taggart. The Examiner stated that Taggart teaches a method for producing a three dimensional preform having a final target shape from textile starting materials wherein 2 dimensional bonded fabric is formed by laying textile materials two dimensionally to form a stack which is subsequently subjected to heated rollers in order to bond the stack together into a two-dimensionally bonded fabric. The subsequent bonded fabric is subjected to shaping or draping to form the bonded three dimensional target shape.

The present invention, as defined in independent claim 1, defines a method for the production of a three-dimensional preform having a final three dimensional target shape, from textile starting materials including components such as fibers, fiber bundles or tapes. The three dimensional preform having a desired fiber orientation and geometry.

The fiber orientation in and the geometry of a two-dimensional fabric are determined by back-calculation from the final three-dimensional target shape, and the

textile starting materials are laid two-dimensionally in a plane to manufacture a two-dimensional fabric in which the fibers are not yet definitely fixed in position and are still movable with respect to each other, whereby the textile starting materials are laid such that the orientation of the fibers of the textile starting material and the geometry of the two-dimensional fabric are as back-calculated from the three-dimensional target shape. The final three-dimensional target shape is produced by at least one of shaping and draping of the two-dimensional fabric, so as to place the fibers, which are not yet definitely fixed in position and are still movable relative to each other, in the desired orientation and geometry, and the textile starting material is fixed by the introduction of a binder after the at least one of shaping and draping.

With regard to the prior art, Taggart et al. describe a process for manufacturing advanced composite structures. Taggart teaches that in a first step a laminate is made including different plies, in each of which the fibers are unidirectional. After a step of cutting the laminate, the laminate is heated and molded using a stamping press.

Claim 1 has been amended herein in several ways. In the preamble, it has been added that the three dimensional preform is to have a desired orientation and geometry. Support for this can be found, at least, page 5, lines 2-5 of the application as filed.

In step b), it has been defined that the fibers are not yet fixed in position and are still movable with respect to each other, as per page 4, line 22 of the application as filed.

Step c) has been amended and newly presented step d) has been added to show that the fibers which are not yet definitively fixed are placed in the desired orientation and geometry of the desired preform. Step d) was added to specify that the

fibers remain unfixed by the introduction of the binder. This was previously disclosed in dependent claim 7.

It is the object of the present invention, to provide a method for producing especially three-dimensional fiber-reinforced components having complex three-dimensional geometries (see description: [0012]).

Claim 1 has been amended to clarify that the single fibers are movable with respect to each other until a binder is supplied after the shaping and draping process that the orientation and position of each of the fibers can be changed apart from the orientation of neighboring fibers.

Taggart et al. describes, in [0042] and [0049] that sheets of fibrous materials, which are laminated one over another is compressed during a consolidation stage. This is done via heated rollers. Taggart also indicates that a thermal compaction step can be applied to hold the fibers in their proper positions for subsequent processing steps, including the shaping/draping process. It is submitted that in view of this compaction, the single fibers within the consolidated laminate stack are fixed relative to each other, even though if by shaping or draping their overall position can be changed.

The Examiner refers to [0055] of Taggart to show that the the laminate stack enables adequate resin flow in the subsequent resin processing step. However, it is respectfully submitted that this passage discloses nothing about the motion of the fibers relative to each other.

In view of the forgoing amendments and arguments, it is respectfully submitted that Claim 1, and the claims dependent therefrom, are allowable over the Taggart reference. Withdrawal of this rejection is therefore respectfully requested.

REJECTIONS UNDER 35 USC 103

Claims 5 and 6 were rejected under 35 USC 103 as being unpatentable over Taggert as described above.

Claims 5 and 6 have been canceled herein, thereby rendering the rejections thereagainst moot.

Claims 1-9 were again rejected under 35 USC 103 as being unpatentable over Taggert and further in view of either one of Wang or Williamson and further in view of any of Cogburn, Cavallaro and Marshall.

The Taggert reference was discussed above in relation to the newly amended claim 1, and those arguments are referred to with respect to the rejections under 35 USC 103.

Wang et al. describe the simulation of the two-dimensional design of single plies of an airfoil. Williamson et al. describe how to back-calculate the two-dimensional pattern of a surface of a three-dimensional body. Both documents were cited in the alternative to give examples for back-calculation of two-dimensional plies from three-dimensional bodies. Neither Wang nor Williamson describe the process of shaping and draping a two-dimensional fabric in order to build a three-dimensional preform and further do not give any hint on the feature that the fibers of a two-dimensional fabric to be shaped or draped in order to build a three-dimensional preform are still at least partially movable with respect to each other with said two-dimensional fabric.

Cogburn et al. describe that the fibers are fixed in tapes connected to each other to form a two-dimensional ply, which is to be folded in order to produce a final three-

dimensional component. Both the fibers within the tapes and the tapes themselves are fixed with respect to their adjacent fibers or tapes. Similarly, Marshall et al. propose fixing single fibers within plies, the plies being positioned adjacent to each other. Neither

Neither Cogburn et al. nor Marshall et al. propose forming bodies having complex three-dimensional geometries and do not give any hint on the feature of preparing a two-dimensional fabric, the textile starting material of which is not yet or not yet definitely fixed in position during shaping and draping said two-dimensional fabric.

Similarly, Cavallaro et al., which was the third document the Examiner cited in the alternative, propose a hockey stick containing a plurality of fiber plies, wherein the fibers are fixed within a ply. During preparation of a three-dimensional hockey stick, the connection points between the fibers are not movable and therefore the additional feature of new claim 1 is not obvious from Cavallaro et al.

It is respectfully submitted that none of the applied references indicate that the orientation and position of individual fibers can be changed independently of the orientation and position of neighboring fibers until the final shape of the three-dimensional preform is attained. Therefore, no reasonable combination of any of the applied references can disclose this feature of amended claim 1.

In view of the above, it is respectfully submitted that no reasonable combination of Taggart and either one of Wang or Williamson and any one of Cogburn, Cavallaro and Marshall yield the invention as described in claim 1 herein.

The remaining claims 2, 3, 8 and 9 depend from claim 1 and are believed allowable based, at least, upon this dependence.

In view of the above, reconsideration and withdrawal of the rejections under 35 USC 103 is respectfully requested.

Summary

As noted above claim 1, and the claims dependent therefrom, are believed to be allowable over the applied art of record. In view of the above, it is submitted that the application is in condition for allowance, and action towards that end is respectfully requested. Should the Examiner wish to modify the application in any way, applicant's attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,

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